

CLAIMS

Sub B⁴ 1. In an information recording medium forming, on a medium surface, information to be reproduced by a reproducing probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

a reproduced-data zone recording reproduced data and a servo pattern zone recording servo data for tracking control are provided on a read-out track to be read by the reproducing probe;

as the servo data being arranged alternately a first groove formed having a depth increased constantly or gradually in one direction perpendicular to both a direction of the read-out track and a direction of a depth of the medium and a second groove formed having a depth increased constantly or gradually in the other direction perpendicular to both the direction of the read-out track and the direction of the depth of the medium, on the read-out track in the servo pattern zone.

2. An information recording medium as claimed in claim 1, characterized in that the first groove and second groove are triangular in section taken in the direction perpendicular to the read-out track.

3. An information recording medium as claimed in claim 1, characterized in that the first groove and second groove are stepwise in section taken in the direction perpendicular to the read-out track.

4. In an information recording medium forming, on a medium surface, information to be reproduced by a reproducing probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

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a reproduced-data zone recording reproduced data and a servo pattern zone recording servo data for tracking control are provided on a read-out track to be read by the reproducing probe;

as the servo data being arranged alternately a first groove formed having an interval in a direction of the read-out track increased constantly or gradually in one direction perpendicular to both the direction of the read-out track and a direction of a depth of the medium and a second groove formed having an interval in the direction of the read-out track increased constantly or gradually in the other direction perpendicular to both the direction of the read-out track and the direction of the depth of the medium, on the read-out track in the servo pattern zone.

5. In an information recording medium forming, on a medium surface, information to be reproduced by a

reproducing probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

a unit of the information comprises a groove formed having a depth constantly or gradually increased in one direction perpendicular to both a direction of a read-out track to be read by the reproducing probe and a direction of a depth of the medium.

6. In an information recording medium forming, on a medium surface, information to be reproduced by a reproducing probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

a section taken in a direction perpendicular to a read-out direction to be read by the reproducing probe is formed in the form of saw tooth, the information being formed along a slant surface constituting the saw tooth.

7. In an information reproducing apparatus for reproducing information by a reproducing probe having a microscopic aperture for producing near-field light, the information reproducing apparatus characterized by comprising:

an information recording medium having on a read-out track to be read by the reproducing probe a reproduced-data zone recording reproduced data and a servo pattern

zone recording servo data for tracking control, the servo data being arranged with a constant deviation alternately left and right with respect to a center axis of the read-out track;

photo-detecting means for detecting reflection scattering light caused due to scattering of the near-field light by the servo data and outputting a detection signal;

comparison operating means for comparing between a detection signal outputted from the photo-detecting means and a synchronization signal determined based on an interval of the servo data and generating and outputting a differential signal; and

reproducing-probe-position control means for controlling a position of the reproducing probe according to the differential signal.

8. In an information reproducing apparatus for reproducing information by a reproducing probe having a microscopic aperture for producing near-field light, the information reproducing apparatus characterized by comprising:

an information recording medium having on a read-out track to be read by the reproducing probe a reproduced-data zone recording reproduced data and a servo pattern zone recording servo data for tracking control, as the

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servo data being arranged alternately a first groove formed having a depth increased constantly or gradually in one direction perpendicular to both a direction of the read-out track and a direction of a depth of the medium and a second groove formed having a depth increased constantly or gradually in the other direction perpendicular to both the direction of the read-out track and the direction of the depth of the medium, on the read-out track in the servo pattern zone;

photo-detecting means for detecting reflection scattering light caused due to scattering of the near-field light by the servo data and outputting a detection signal;

comparison operating means for comparing between a detection signal outputted from the photo-detecting means and a synchronization signal determined based on an interval of the servo data and generating and outputting a differential signal; and

reproducing-probe-position control means for controlling a position of the reproducing probe according to the differential signal.

9. In an information reproducing apparatus for reproducing information by a reproducing probe having a microscopic aperture for producing near-field light, the

information reproducing apparatus characterized by comprising:

an information recording medium having on a read-out track to be read by the reproducing probe a reproduced-data zone recording reproduced data and a servo pattern zone recording servo data for tracking control, as the servo data being arranged alternately a first groove formed having an interval in a direction of the read-out track increased constantly or gradually in one direction perpendicular to both the direction of the read-out track and a direction of a depth of the medium and a second groove formed having an interval in the direction of the read-out track increased constantly or gradually in the other direction perpendicular to both the direction of the read-out track and the direction of the depth of the medium, on the read-out track in the servo pattern zone;

photo-detecting means for detecting reflection scattering light caused due to scattering of the near-field light by the servo data and outputting a detection signal;

comparison operating means for comparing between a detection signal outputted from the photo-detecting means and a synchronization signal determined based on an interval of the servo data and generating and outputting a differential signal; and

reproducing-probe-position control means for controlling a position of the reproducing probe according to the differential signal.

10. In an information reproducing apparatus for reproducing information by a reproducing probe having a microscopic aperture for producing near-field light, the information reproducing apparatus characterized by comprising:

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an information recording medium forming a unit of the information as a groove formed having a depth constantly or gradually increased in one direction perpendicular to both a direction of a read-out track to be read by the reproducing probe and a direction of a depth of the medium;

photo-detecting means for detecting reflection scattering light caused due to scattering of the near-field light by the servo data and outputting a detection signal; and

reproducing-probe-position control means for controlling a position of the reproducing probe according to an intensity of the detection signal.

11. In an information reproducing apparatus for reproducing information by a reproducing probe having a microscopic aperture for producing near-field light, the

information reproducing apparatus characterized by comprising:

an information recording medium having a section taken in a direction perpendicular to a read-out direction to be read by the reproducing probe being formed in the form of saw tooth, the information being formed along a slant surface constituting the saw tooth;

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photo-detecting means for detecting reflection scattering light caused due to scattering of the near-field light by the servo data and outputting a detection signal; and

reproducing-probe-position control means for controlling a position of the reproducing probe according to an intensity of the detection signal.

12. In an information reproducing apparatus for reproducing information by a reproducing probe having a microscopic aperture for producing near-field light, the information reproducing apparatus characterized by comprising:

an information recording medium forming the information on a read-out track to be read by the reproducing probe;

a reproducing probe having microscopic apertures formed having an interval in a direction of the read-out track increased constantly or gradually in one direction

perpendicular to both a direction of the read-out track and a direction of a depth of the medium;

photo-detecting means for detecting reflection scattering light caused due to scattering of the near-field light (produced at the microscopic aperture) by the information and outputting a detection signal; and

reproducing-probe-position control means for controlling a position of the reproducing probe according to an intensity of the detection signal.

13. In an information recording medium for recording/reproducing information at a medium surface by a probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

a data zone recording/reproducing data and a servo pattern zone recording servo data for tracking control are provided on a track to be recorded/reproduced by the reproducing probe; and

as the servo data, two of the servo data having a surface form or sectional form asymmetric about a direction of the track and line-symmetric about a center axis of the track arranged on the track in the servo pattern zone.

14. In an information recording medium for recording/reproducing information at a medium surface by a

probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

a unit of the information has a surface form or sectional form asymmetric about a direction of a track to be recorded/reproduced by the probe.

15. In an information recording medium for recording/reproducing information at a medium surface by a probe having a microscopic aperture for producing near-field light, the information recording medium characterized in that:

a section in a direction perpendicular to a scanning direction to be recorded/reproduced by the probe is formed by a track asymmetric about the scanning direction, the information being formed along a slant surface constituting the track.

16. In an information recording/reproducing apparatus for recording/reproducing information by a probe having a microscopic aperture for producing near-field light, the information recording/reproducing apparatus characterized by comprising:

an information recording medium as claimed in any one of claims 13 to 15;

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photo-detecting means for detecting reflection scattering light caused due to scattering the near-field light and outputting a detection signal; and

probe-position control means for controlling a position of the probe according to an intensity of the detection signal or a differential signal between the detection signal and a reference signal as a reference.

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